U.S. NUCLEAR REGULATORY COMMISSION

REGION I

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Report No.	50-247/98-10
Docket No.	50-247
Licensee:	Consolidated Edison Company of New York, Inc.
Facility Name:	Indian Point 2 Station
Location:	Broadway and Bleakley Avenues Buchanan, NY 10511
Inspection Period:	June 8 - 12, 1998
Inspectors:	P. Bissett, Senior Operations Engineer J. D'Antonio, Operations Engineer S. Schwind, Indian Point 2 Resident Inspector F. Talbot, Reactor Operations Engineer, NRR W. Galyean, NRC Consultant, INEEL
Approved by:	Richard J. Conte, Chief Operator Licensing and Human Performance Branch Division of Reactor Safety

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EXECUTIVE SUMMARY

This inspection involved a review of Consolidated Edison's Indian Point 2 implementation of the maintenance rule in accordance with the regulations of 10 CFR 50.65. The report covers a one week onsite inspection by regional and headquarter's inspectors during the week of June 8 - 12, 1998.

The team concluded that Indian Point 2 had implemented, at the time of the inspection, an effective, thorough maintenance rule program, based on the following aspects.

- With the exception of the control room annunciators, emergency lighting and the communications system, which were considered an apparent violation of 10 CFR 50.65 b, Indian Point 2 had appropriately scoped facility SSCs for inclusion into the maintenance rule. As a result of the ongoing maintenance rule upgrade project, some system functions had been added in scope. The inspector considered these to be conservative additions and not to be examples of oversights in the original scoping effort.

- Availability performance criteria were determined to have been developed in a acceptable manner. The sensitivity analyses performed on the effect of the performance criteria (PC) on core damage frequency indicate consistency with the probabilistic risk analysis (PRA) assumptions. Reliability PC was also performed in a acceptable manner and consistent with the PRA assumptions.

- The establishment of SSC risk significance was deemed acceptable. All SSCs were determined to have been appropriately ranked in regard to risk. The licensee's establishment of performance criteria for (a)(2) SSCs was also acceptable.

- The expert panel was functioning well under it's new charter. The roles, composition, and meeting requirements were clearly established under the charter, and were understood by the panel members. The addition of system health reviews to the panel's function was a good initiative and provided a means of communicating system status to senior management.

- Appropriate goal setting was in place for those SSCs that were in an (a)(1) status. The cause determinations for (a)(1) systems and corrective actions for a(1) systems were appropriate and goal setting and monitoring addressed the identified problems and actions. Corrective and preventive maintenance was appropriate and effective for those SSCs in (a)(2), however, it was determined that several systems were not placed into an (a)(1) status in a timely manner when performance criteria were exceeded. Con Ed's failure to place the systems into an (a)(1) status in a timely manner commensurate with safety was an apparent violation of 10 CFR 50.65 (a)(2).

- The periodic assessment was acceptable, however, it was noted for SSCs monitored under 50.65(a)(2), that the licensee only sampled high safety significant SSCs to verify that a balance between reliability and availability was achieved. In addition, SAO-420 was adequate in evaluating the use of industry operating events when implementing the maintenance rule requirements.

- Con Edison had established procedural guidance for assessing risk while taking equipment out-of-service on-line and during outages. The on-line Risk Estimator software is scheduled to be replaced with the more sophisticated Safety Monitor software prior to completion of the current outage. An inspector follow item was opened pending Con Edison's completion of operator training on the new software and resolution of configuration control issues. Outage risk assessment was generally being performed adequately.

- Operations department staff knowledge of the maintenance rule was commensurate with their level of involvement. System engineering knowledge of the rule and of their specifics systems was very good. Licensed operators and system engineers were able to fulfill their responsibilities under the rule during normal operations and emergent work situations. Their understanding of rule was acceptable.

- The self assessments and audit/surveillance reports were detailed and thorough. The thoroughness and responsiveness to these audit findings helped to ensure that Indian Point 2 correctly implemented the requirements of the maintenance rule.

- The condition monitoring program for structures and the overall material condition of the SSCs walked down were good.

- The licensee had implemented acceptable corrective actions to address primary auxiliary building roof leakage, resulting in acceptable resolution of an Unresolved Item.

Report Details

M1 Conduct of Maintenance (62706)

M1.1 Structures, Systems and Components (SCCs) Included Within the Scope of the Rule

a. Inspection Scope

The team reviewed the scoping documentation to determine if the appropriate structures, systems and components (SSCs) were included within Indian Point 2's maintenance rule program in accordance with 10 CFR 50.65(b). The team used NRC Inspection Procedure (IP) 62706, NUMARC 93-01, Regulatory Guide (RG) 1.160, the Indian Point 2 Updated Final Safety Analysis Report (UFSAR), emergency operating procedures (EOPs), and other information provided by Indian Point 2 as references.

The team also reviewed additional information in system maintenance rule basis documents on scoping decisions for the following SSCs: auxiliary feedwater, main steam, service water, 480v, control rod drive, emergency diesel generators, component cooling water, DC power, safety injection, and residual heat removal.

b. Observations and Findings

The team determined that Indian Point 2 (IP2) had adequately defined scoping boundaries for each system and components within each system that had been included within the scope of the maintenance rule. A total of 90 structures, systems and components (SSCs) were considered for inclusion under the maintenance rule. The facility had scoped these systems for inclusion into the maintenance rule by determining system functions and evaluating each function against the criteria of NUMARC 93-01. This evaluation had been performed by the individual system engineers and approved by the expert panel. This evaluation resulted in ten systems listed in scoping documentation as not being in scope due to having no functions determined to be within the scope of the rule. The inspector requested justification for several systems/functions which appeared to warrant inclusion in scope, i.e., process computer, secondary sampling, and freshwater cooling. Adequate justification was provided for most functions. In the following instances, system engineers reviewing their systems, as part of the facility maintenance rule upgrade project, had determined that the additional functions should be included in scope, however, the new scoping documentation had not been presented to the expert panel for approval:

- Primary water backup cooling for SI and RHR pumps.
- Freshwater cooling for unit 1 station air compressors.
- Unit 1 fuel handling building.
- 14 of 49 Control Room annunciator functions.

For the first three of these four systems/functions, the inspector determined the decision to include them in scope to be conservative one. For the annunciator system, the system engineer has recategorized the annunciators into 10 functions, with 8 of these 10 functions considered to be in scope. The inspector concurred with the remaining exclusions. This reclassification was necessary to meet the requirements of the rule. It was not considered by the team to be a conservative change on the part of the licensee. This failure to properly scope the control room annunciators in regard to the maintenance rule is a violation of 10 CFR 50.65.

Also, it was determined that the licensee had failed to include portions of emergency lighting and the communications system within the scope of the maintenance rule until June 2, 1998 and April 6, 1998, respectively. These are non safety-related SSCs that are relied upon to mitigate accidents or transients, or are used in the plant emergency operating procedures, or whose failure could prevent SSCs from fulfilling their safety-related function, or whose failure could cause a reactor scram or actuation of safety-related systems.

The above are examples of an apparent violation of 10 CFR 50.65 (b).
(EEI 50-247/98-10-01)

c. Conclusions

With the exception of the control room annunciators, emergency lighting and the communications system, which were considered an apparent violation of 10 CFR 50.65 b, Indian Point 2 had appropriately scoped facility SSCs for inclusion into the maintenance rule. As a result of the ongoing maintenance rule upgrade project, some system functions had been added in scope. The inspector considered these to be conservative additions and not to be examples of oversights in the original scoping effort.

M1.2 Safety (Risk) Determination, Risk Ranking, and Expert Panel

a. Inspection Scope

Paragraph (a)(1) of the maintenance rule requires that goals be commensurate with safety. Implementation of the rule using the guidance contained in NUMARC 93-01 also requires that safety be taken into account when setting performance criteria and monitoring under (a)(2) of the rule. This safety consideration would then be used to determine if the structures, systems and components (SSCs) should be monitored at the train or plant level. The team reviewed the methods that the licensee had established for making these required safety determinations. The team also reviewed the safety determinations that were made for the systems that were reviewed in detail during this inspection.

The team reviewed Con Edison's Station Administrative Order (SAO) 160, "Maintenance Rule Implementation", as it pertains to the expert panel's duties and responsibilities. The team attended several expert panel meetings and met with panel members to assess their understanding of the maintenance rule and the conduct of review activities.

b. Observations and Findings

b1. Risk Ranking

System engineers generated the list of functions for each system regardless of what was modeled in the PRA. The expert panel reviewed the PRA, and judged each system function as risk-significant or not. Essentially all IPE systems/functions were judged as risk (high) significant. (the only exception being the refill of the RWST during a SGTR accident, which is mostly dependent on operator actions.) This aspect renders the risk ranking (i.e., importance measure and CDF contribution) immaterial. Specifically, nothing in the PRA was judged "not risk significant."

b2. Performance Criteria

Performance criteria were developed following the "EPRI Methodology," (EPRI Technical Bulletin 96-11-01, Nov 1996; and EPRI Technical Bulletin 97-3-01, March 1997).

IP2 QA Program Document SE-SQ-12.108 section 5.4.11, item j, states: "Performance criteria should be developed by System Engineers and the MRC using 'Maintenance Rule Performance Criteria Developing/Monitoring' as documented in SE-303." Document SE-303, Rev. 0, sections 3.7 and 3.8 guides the development of performance criteria (PC) by setting the number of failures such that the resulting cumulative probability is at least 95%. This effectively amounts to rounding up the number of allowable failures such that the statistical significance of the data is smaller than 5%. That is, it is possible to not exceed the performance criteria, yet the probability of seeing experience more extreme than that demonstrated and still be consistent with the underlying reliability, is less than 5%.

System basis documents (one for each system and maintained by the system engineers) list the performance criteria for each function identified as "in-scope." In each case examined, the actual PC produced was such that the significance level was equal to or greater than 5% (i.e., the number of failures was rounded down). Either method is acceptable; however, the latter approach is more conservative (i.e., rounding the number of failures down). IP2 has agreed to update their procedure to reflect what was actually done, that is, rounding down the calculated number of failures.

Performance criteria for those components (functions) not modeled in the PRA were developed utilizing surrogates that are modeled in PRA. Specifically, if a particular piece of equipment is deemed within the MR, but is not modeled (quantified in the PRA) then reliability data for a similar component is used to establish the performance criteria.

Performance criteria, as actually calculated, appear consistent with the assumptions modeled in the PRA. A spot check was performed in which the reliability estimated from the PC was compared to the mean estimates from the PRA. All cases checked produced PC based reliability estimates that were within 1-order of magnitude of the mean estimate from the PRA. (Note this comparison effectively assumes an error factor of 10 on the mean estimates from the PRA.) In addition, IP2 PRA staff performed a small number of sensitivity studies during the inspection. The greatest increase in CDF occurred when the reliability estimate for a single AFW motor-driven pump was set at the PC (1 failure in 8 demands). In this case the CDF increased by 68% (from 2.8E-5 to 4.8E-5). (Note that if the PC were calculated as directed in the procedure, which is rounding the number of failures up, this issue would need to be revisited.)

Sensitivity studies were previously performed by IP2 on the unavailability PC. In this analysis the unavailability PC were used to update the original PRA estimates in a Bayesian process. Calculations were performed for individual components and for the entire set (i.e. a single calculation performed using revised unavailability estimates for all MR components.)

When performing sensitivity analyses on unavailability PC for the safety injection accumulators, initially a 24 hour (over 24 months) unavailability PC was proposed. This resulted in a CDF increase of 11%. This 24-hour PC was then reduced to 8 hours (over 24 months), which produced a 4% increase in CDF. When all unreliability PC were analyzed collectively, CDF was increased by 11%. PSA Applications Guide (EPRI TR-105396, August 1995) recommends an increase of no more than 18% (for a baseline CDF of 3E-5).

b3. <u>Expert Panel</u>

The expert panel was established in 1996 in order to review and approve the initial implementation of the maintenance rule. The original charter, effective as of July, 1996, assigned approval regarding the risk significance of SSCs within the scope of the maintenance rule as the primary function of the expert panel. In addition, the panel also reviewed and concurred with SSC selection, performance criteria, goal setting, dispositioning of SSC to (a)(1) or (a)(2), and periodic assessments. Panel composition and meeting requirements were delineated in the charter; however, these requirements were generic in nature. These requirements were clarified when the panel charter was revised in March, 1998 as part of the maintenance rule upgrade program. In addition to this clarification, the new charter added system health reviews to the panel functions. The current panel conforms to the new charter and is composed of a diverse management group possessing adequate experience to perform the panel's functions.

No expert panel meetings were scheduled during this inspection; however, a team member had the opportunity to attend several panel meetings on previous occasions. The panel maintained a questioning attitude regarding scoping of SSCs, system boundaries, and performance criteria and demonstrated conservative decision making when dispositioning systems to (a)(1). The team noted an example of this when the emergency diesel generator building heating, ventilation and air conditioning (EDG HVAC) system was placed into (a)(1) status by the panel. The system was meeting its performance criteria; however, the panel placed it in (a)(1) due to the lack of an adequate surveillance program to monitor system status. The addition of system health reviews during panel meetings also provided an avenue for discussing degraded conditions and recommended system upgrades.

Initial panel activity in 1996 was high while completing the initial reviews but this dropped significantly until the upgrade program began. During the program upgrade, the panel has met approximately three times per week in order to review all systems within scope. The panel chairman indicated that regularly scheduled meetings would continue, approximately once per week after the program is complete, in order to continue monitoring SSCs within the scope and conduct system health reviews.

c. Conclusions

Availability performance criteria were developed in a acceptable manner. The sensitivity analyses performed on the effect of the performance criteria (PC) on core damage frequency indicate consistency with the probabilistic risk analysis (PRA) assumptions. Reliability PC was also performed in a acceptable manner and was consistent with the PRA assumptions.

The establishment of SSC risk significance was acceptable. All SSCs were determined appropriately ranked in regard to risk. The licensee's establishment of performance criteria for (a)(2) SSCs was also acceptable.

The expert panel was functioning well under its new charter. The roles, composition, and meeting requirements are clearly established under the charter and are understood by the members. The addition of system health reviews to the panel's function was a good initiative and provided a means of communicating system status to senior management. The panel's decisions, regarding the risk significance and performance criteria and knowledge of on-line and shutdown risk assessment, were appropriate in implementing the requirements of the maintenance rule.

M1.3 (a)(1) Goal Setting and Monitoring and (a)(2) Preventive Maintenance

a. Inspection Scope

The team reviewed program documents to evaluate the process established to set goals and monitor under (a)(1) and to verify that preventive maintenance had been demonstrated to be effective for SSCs under (a)(2) of the maintenance rule. The team also verified that appropriate performance criteria had been set for several SSCs. The team performed detailed programmatic reviews of the maintenance rule implementation for the following SSCs:

- Auxiliary Feedwater
- Main Steam
- Service Water
- 480v
- Control Rod Drive
- Emergency Diesel Generators
- Component Cooling Water
- DC Power
- Safety Injection System
- Residual Heat Removal
- Structures

Each of the above systems was reviewed to verify that goals or performance criteria had been established commensurate with safety, that industry-wide operating experience was considered, that appropriate monitoring and trending were being performed, and corrective actions were taken when an SSC failed to meet its goal or performance criteria, or experienced a maintenance preventable functional failure (MPFF). Goals and performance criteria for additional SSCs not listed above were also reviewed; however, the depth of review was limited in scope.

b. Observations and Findings

The above systems were properly scoped and appropriately placed in either an (a)(1) or (a)(2) status. Performance criteria and goal setting for all systems reviewed were adequate, however, the team did identify that the dispositioning of systems from (a)(2) to (a)(1), when performance criteria were not met, was not accomplished in a timely manner. The team identified that ConEd failed to adhere to the following 10 CFR 50.65 requirements.

On July 10, 1996, the licensee placed the chemical volume control system boric acid transfer pumps, three 13.8 kv trains, emergency diesel generators, the public address portion of the communications system, control room heating ventilation, and air conditioning (HVAC) booster fans, HVAC control rod drive and electrical tunnel exhaust fans, hydrogen monitors and recorders, and fuel rods under Section 50.65(a)(2). Following repetitive maintenance preventable functional failures (MPFFs), several MPFFs, repetitive functional failures (FFs), and/or excessive unavailability, the licensee allowed the systems to remain under 10 CFR 50.65(a)(2) for excessive periods of time ranging from three months to 1.75 years. These failures and/or excess unavailability times demonstrated that the preventive maintenance being performed on these systems was not appropriate and failed to assure that the systems remained capable of performing their intended functions. These systems should have been placed under 50.65(a)(1) in a timely manner commensurate with safety following repetitive or numerous failures and/or excessive unavailability times.

On July 10, 1996, the licensee placed the component cooling water pump train 21, service water system, HVAC fans which support the emergency diesel generators, source range nuclear instrumentation, hydrogen recombiner trains, and the fuel transfer cart under 50.65(a)(2). Following recent changes to performance measures in 1998, the licensee determined that these systems should have been placed under 50.65(a)(1) as a result of repetitive FFs, MPFFs, or excess unavailability. The licensee incorrectly allowed these systems to remain under 10 CFR 50.65(a)(2) for excessive periods of time ranging from three months to 1.75 years. These failures and excess unavailability demonstrated that the preventive maintenance being performed on these systems was not appropriate and failed to assure that these systems remained capable of performing their intended functions; therefore, these systems should have been placed under 10 CFR 50.65(a)(1) following these failures and/or excess unavailability with appropriate goals established.

ConEd's failure to place the systems into an (a)(1) status in a timely manner commensurate with safety is an apparent violation of 10 CFR 50.65 (a)(2).
(EEI 50-247/98-10-02)

RHR System

The team found that the licensee identified all required SSCs within the scope of the maintenance rule for the RHR system. RHR performance criteria were found to be acceptable. In addition, two RHR breaker failures occurred since 1995 along with a minimal amount of unavailability; therefore, RHR performance criteria were not exceeded and system performance was acceptable. In addition, material condition of the RHR system was acceptable.

The team found that the licensee identified eight of nine RHR functions that were under the scope of the maintenance rule. The team questioned whether a seperate function existed for the RHR system to gravity feed the reactor coolant system from the refueling water storage tank (RWST) on loss of both RHR pump trains during mid loop operations. The licensee provided the team with SAO-100, Loss of the RHR System, dated June 11, 1998, which provides instructions to operators on gravity flow paths from the RWST to the RCS when a loss of both trains of RHR occurs. The team found that safety injection discharge valves 856A, B, C, D, E, and F could be opened along with verifying safety injection valve 1810 and RHR suction valve 882 were open to provide two seperate paths of gravity injection to the RCS. Both flow paths involve safety related components already under the scope of the maintenance rule for other functions; therefore, the licensee determined that a seperate gravity feed function for the RHR system was not needed. The team found this to be acceptable.

The performance criteria for RHR include 102 hours unavailability/24 months, less than or equal to 1 MPFF/24 months, and no repetitive MPFFs for each RHR pump train. The team found the RHR maintenance rule performance measures acceptable.

The team also found that two breaker failures occurred since February, 1995 involving MPFFs that affected the RHR system. In both cases, these MPFFs on breakers were counted against the RHR system; however, RHR discharge check valve 838D experienced back leakage of 7.93 gpm forcing a plant shutdown due to exceeding the identified leakage rate of 5 gpm. The team questioned whether this failure should be counted against the RHR system. The licensee stated that this valve function was counted against the Reactor Coolant System pressure boundary function since this is an RHR system boundary valve with RCS and therefore counted against the RCS. In addition, the team found that the RHR system was not exceeding its reliability or unavailability performance criteria; therefore, the team found that RHR system performance was acceptable.

Safety Injection System

The team found that the licensee identified all SSCs within the scope of the MR for the SIS system. The team also found that the licensee was monitoring SIS under 50.65(a)(1) with acceptable goals established and taking adequate corrective action to improve SIS performance. During an SIS walkdown, the team found that SIS material condition was good.

The team found that the licensee identified seven of eight functions that were under the scope of the maintenance rule for the safety injection system (SIS). In addition, the team verified that appropriate boundaries had been established for SSCs within the SIS, the reactor coolant system (RCS), the RHR system, the containment spray system (CSS), the component cooling water (CCW) system, and chemical volume control system (CVCS), the isolation valves seal water (ISVW) system, the 480 volt electrical system, and other systems that interfaced with the SI system.

The team found that the licensee was monitoring SIS under 10 CFR 50.65(a)(1) with the following performance measures or goals established: For the three trains of SIS high head injection phase function 01, the goals are less than or equal to 114 hours unavailability, less than or equal to 1 maintenance preventable functional failure (MPFF), 0 repetitive MPFFs per 24 months rolling cycle, and 0 hours unavailability and 0 MPFFs for the refueling water storage tank (RWST) suction line and valves per 24 months rolling cycle. SIS functions 02 and 03 which inject to the cold leg and hot leg of RCS have the same goals. SIS function 04, recirculate borated water into the RCS from the two train containment recirculation pumps had the following goals: 0 hours unavailability and 0 MPFFs per 24 months and condition monitoring applies. SIS function 05, maintain integrity of the piping boundary during the recirculation phase for three trains of safety injection pumps; had goals of 0 MPFFs. SIS function 06, passive safety injection via 4 trains of safety injection accumulators, had performance criteria of 8 hours unavailability and 1 MPFF per 24 month rolling cycle while at power. The team found these goals acceptable.

The team found that the licensee condition identification tracking reporting system (CITRS) tracked 5 MPFFs and 1 repetitive MPFF and the work order system (WOS) tracked 7 MPFFs and 1 repetitive MPFF for the SIS system. Using the CITRS and WOS, the team found that the licensee adequately tracked MPFFs; however, the team questioned whether CITRS and WOS adequately tracked MR FFs. For example, two RWST level transmitter lines were found frozen due to cold weather on January 21 and 27, 1994. Both level transmitter were not frozen at the same time. The licensee performed corrective maintenance to return each level transmitter to service within four hours. These instruments give annunciator indication to operators in the control room on low RWST level which requires operators to manually switch over to the recirculation phase of SIS following a design basis loss of coolant accident (LOCA); however, these events were not tracked as FFs for the SIS. The team found that the licensee has two level transmitters, one float level recorder and one level indicator in the control room which provide operators with RWST annunciator alarms and level indication in the control room. Based on the redundancy in annunciator alarms and level indication in the control room, the team found that these events were not FFs but degraded conditions for the SIS. Based on all the MPFFs that occurred on SIS, the team found that the licensee was taking adequate corrective actions to improve SIS performance.

Service Water (SW)

The service water system was a normally operating, risk significant system. The system performance criteria addressed 14 functions with performance criteria split among pumps-component level, pumps-system level, and other components at the function level. This system was in an (a)(1) status due to 22 functional failures in the evaluation period; 12 of these were in SW mechanical components, the rest were pump breaker failures. The pump breakers were within the boundaries of this system but were being addressed as a separate system for corrective action. Corrective action for the mechanical failures included replacement of pumps and valves with new design components and materials and procedural revisions. The inspector considered the corrective actions to address the identified root causes of the problems. Goals had been set for failures over three surveillance periods; these goals were appropriate to monitor the effectiveness of corrective actions.

The inspector reviewed 50 of 475 items in the CITRIS database concerning service water and concurred with the system engineers evaluation that these items were not functional failures.

480 VAC

The 480 VAC system was a normally operating risk significant system. This system was indicated as having four maintenance rule functions; performance criteria were evaluated for busses and for MCCs. This system was considered to be in an (a)(1) status for two MPFFs of breakers within the system boundaries (one bus supply breaker, one MCC supply breaker) and 25 failures of breakers within the boundaries of other systems.

Documentation of the load breaker failures was somewhat confusing in that load breakers belong to their systems and MPFFs of these breakers count against performance criteria of those systems, not the 480 VAC system; however, corrective action for these failures belonged to the 480 VAC system engineer and these breaker failures were listed in the 480 VAC basis document. Additional confusion resulted from the fact that in February, 1998 the maintenance rule coordinator applied maintenance rule documentation to this cross-system problem by preparing goal evaluation documentation for "480VAC(DB-50 breakers) as if these components did belong to the 480 VAC system.

The inspector reviewed the evaluation, troubleshooting, and testing that had been performed to determine the causes for the failures. This troubleshooting was described in condition report 97-65 and included high speed photography of breaker operation and identified several root causes due to interactions between mechanical clearances, component motions, and timing of breaker operations. The corrective actions taken and goals established were appropriate for the problems identified.

Control Rod Dive (CRD)

Control Rod Drive was a normally operating non risk significant system, monitored at the plant level. Although this system was not monitored by functional failures for the maintenance rule, the evaluation of this system, by the system engineer, appeared to be equivalent to that done on other systems. Troubleshooting and corrective actions had been performed for two problems under condition report 97-047. One problem was open fuses for stationary and moveable gripper coils discovered during low power physics testing; the second problem was six apparently invalid urgent failure alarms. Improper handling was considered the cause of the fuse failures and was corrected by procedure changes. High temperature was determined to be the cause of the alarms; corrective action was to run HVAC ducts into the equipment cabinets and will be evaluated for adequacy when the plant restarts. The inspector considered the evaluations adequate and the corrective actions appropriate.

Gas System

The team found that the licensee identified all Gas System SSCs and functions under the scope of the maintenance rule with appropriate performance criteria established. The team also found that the Gas System is being appropriately monitored under 10 CFR 50.65(a)(2).

The team reviewed the system basis documents for the Gas System and found 16 functions were correctly identified as being under the scope of 10 CFR 50.65(b). The team also found that performance measures established for the 16 gas system functions were acceptable. The licensee is currently monitoring the Gas System under 10 CFR 50.65(a)(2). The team found that one MPFF occurred on the nitrogen gas system when the licensee failed to take prompt corrective action for chronic leakage associated with a nitrogen supply line inside containment, causing operators to leave PCV-863 open to compensate for the leakage condition until it was identified as a violation of NRC requirements in Integrated Inspection Report 96-04 (i.e., refer to Enforcement Action ((EA))-272) on July 11, 1996. This condition was also found to be an operator work around which existed for an extended period of time without corrective actions taken to eliminate the leakage condition found in the nitrogen gas line.

The team reviewed the licensee's response to EA-272, dated November 8, 1996, the Modification Procedure FPX-97-88532-F, SOV 863 Containment Isolation Phase "A" Actuation Signal, dated March 1, 1997, and Report on Installation, dated July 10, 1997, modification FPX-97-88532-F, SOV 863 Containment Isolation Phase A Actuation Signal, on design modifications and corrective maintenance work orders on the gas system. The team found that corrective actions included (1) addition of an automatic containment isolation phase "A" signal to SOV 863 which automatically closes PCV-863 on a design basis LOCA, (2) elimination of leaks in the nitrogen gas lines, (3) completion of a 10 CFR 50.59 evaluation which justified the design modification, and revisions to the Updated Final Safety Analysis Report that added the automatic containment isolation function of PCV-863; therefore, the team found that the licensee's corrective actions were acceptable to close EA-272. In addition, the team walked down accessible portions of the gas system and found the material condition to be acceptable.

<u>Structures</u>

The facility developed an adequate maintenance rule structural inspection monitoring program and was performing it. Baseline maintenance rule inspections were completed. The civil engineering department was in the process of entering data into both a computer database and individual report books for each structure. Deficiencies from these reports were being evaluated and prioritized for dispositioning/ trending/ reinspection.

The licensee's structural monitoring program is described in Civil Projects and Programs specification number FCX-97-C-002 "Maintenance Rule Structural Monitoring Program". This procedure identifies 69 structures, with 37 in-scope with regard to the maintenance rule. Baseline inspections had been completed for all structures, with reinspections planned on a 5 year schedule. Inspection results were being entered in a database for evaluation, prioritization of corrective action, and trending. This procedure addressed civil engineering issues, but did not incorporate other monitoring activities such as containment leak rate tests or health physics environmental monitoring. No structures were in an (a)(1) status.

No quantitative performance criteria were established in this procedure. Inspection results were evaluated via checklists and the use of degreed civil engineers for evaluation. Structures were divided into three categories based on these evaluations; a structure would be considered unacceptable and in an (a)(1) status if a condition was found such that the structure may rapidly deteriorate to the point where it could not perform its intended function.

The inspector reviewed the results of inspections in the Unit 2 containment and primary auxiliary building and walked down these buildings with the program administrator. The inspections appeared to have been thorough and the facility personnel with the inspector were familiar with the results. One instance was noted of coordination between structures and systems where the civil engineers had assisted the containment fan cooler engineer in a system walkdown and identified mounting and bolting deficiencies, resulting in modification to the anchoring of the fan cooler units.

c. Conclusions

The team determined that appropriate goal setting was in place for those SSCs that were in an (a)(1) status. The cause determinations for (a)(1) systems and corrective actions for a(1) systems were appropriate and goal setting and monitoring addressed the identified problems and actions. The team also concluded that corrective and preventive maintenance was appropriate and effective for those SSCs in (a)(2), however, it was determined that several systems were not placed into an (a)(1) status in a timely manner when performance criteria were exceeded. Con Ed's failure to place the systems into an (a)(1) status in a timely manner commensurate with safety was an apparent violation of 10 CFR 50.65 (a)(2).

M1.4 Periodic Evaluations (a)(3) and Plant Safety Assessments Before Taking Equipment Out-of-service For Maintenance

a. Scope

Paragraph 10 CFR 50.65(a)(3) requires that performance and condition monitoring activities and associated goals and preventive maintenance activities shall be evaluated at least every refueling cycle provided the interval between evaluations does not exceed 24 months. The evaluations shall take into account, where practical, industry wide operating experience adjustments shall be made where necessary to ensure that the objectives of preventing failures is balanced against the objectives of minimizing unavailability for structures, systems and components (SSCs) due to monitoring of preventive maintenance. The team reviewed the periodic evaluation for Indian Point Unit 2, which was completed by the licensee for the period of July, 1996 through December, 1997.

The team reviewed Con Edison's procedures for performing on-line maintenance and discussed the process with applicable personnel, including a PRA engineer, work control managers, watch crew personnel, and the operations manager. The team also observed a demonstration of the Risk Estimator and Safety Monitor software packages used for on-line safety assessment.

b. Observations

b.1 Periodic Evaluations

The team found that the licensee evaluated maintenance rule (MR) functional failures (FFs) for all systems under the scope of the MR to verify that SSCs were meeting reliability and plant level performance measures. However, the team found that the licensee only sampled a small number of high safety significant (HSS) SSCs to determine if a balance was achieved between reliability and availability. The team questioned the licensee on whether a balance between reliability and availability was verified for all HSS SSCs. The licensee stated that 23 SSCs were currently being monitored under 50.65(a)(1) for exceeding reliability and availability performance criteria which indicated that a balance was not being achieved between reliability and availability for these systems. For systems monitored under 50.65(a)(1), the licensee increased condition monitoring, established goals, increased preventive and corrective maintenance and took corrective actions to improve SSC performance. For systems monitoring under 50.65 (a)(2), the licensee evaluated only a sample of HSS SSCs to verify that these SSCs had achieved a balance between reliability and availability. The team noted that not formally assessing balance for all HSS SSCs could adversely impact the effectiveness of the licensee's periodic assessment program.

The team reviewed the licensee's quarterly reports on equipment reliability and availability and verified that SSCs monitored under 50.65(a)(2) were not experiencing high unavailability due to failures or preventive maintenance. The licensee stated that the next periodic assessment would verify that a balance was being achieved between reliability and availability for all HSS SSCs monitored under 50.65(a)(2). The team also found that a minimal amount of industry operating experience (IOE) was used to establish performance criteria or to verify that a balance between reliability and availability was being achieved. In addition, minor revisions were made to Station Administrative Order (SAO) - 420, Operating Experience Procedure (OER) Program, which takes into account use of IOE for SSCs being monitored under 50.65(a)(1) and periodically evaluated under 50.65(a)(3).

b.2 Safety Assessments before taking equipment out-of-service for maintenance

The procedures for safety assessments before taking equipment out-of-service while on-line and during outages are contained within operations administrative order (OAD) 37, "Guidelines for performing operations planning and review", and OAD 38, "Outage risk management", respectively.

Guidance contained in OAD 37 primarily deals with the use of the Risk Estimator software used for safety assessments on-line. This was an older software package which had several limitations as outlined in the OAD. The software would only allow for the selection of one component per system and did not fully account for component interactions within a system (ex. the software may not consider a pump out-of-service if its supply breaker is placed out-of-service). This software was scheduled to be replaced by the Safety Monitor software prior to startup from the current outage. Safety Monitor was a more complex package without the aforementioned limitations of Risk Monitor. The team noted that there was approximately one month left in the outage schedule for Safety Monitor to be implemented and several open items existed in this regard: The applicable operators have not yet received formal training on use of the software, and configuration control of the software and data entry had not been established. An inspector follow item is being opened to track Con Edison's resolution of these two issues (IFI 50-246/98-10-01).

OAD 38 contains procedural guidance for risk assessment of equipment out-of-service during outages. Seven shutdown safety functions were identified: reactivity, core cooling, power availability, containment, spent fuel pool cooling, inventory, and reactor coolant system (RCS) integrity. For each one of these functions, the availability of equipment required for these functions was assessed and a quantitative risk measure corresponding to a particular color coded category of green, yellow, orange, or red was assigned to the potential combination of equipment out-of-service. Work control managers and watch crew personnel were knowledgeable of this procedure and the potential effects of unexpected equipment failures on the shutdown safety functions.

The team reviewed shutdown safety assessments performed for the current outage and noted that the procedure was generally well implement. In cases where planned work would place a safety function in an orange condition, contingency plans were established and briefed to the watch crews prior to beginning work. In one case, however, a tagout was issued from the work control center for the 22 residual heat removal (RHR) pump which was in standby. At the time, the 21 RHR pump was in-service and Technical Specifications required specifying an alternate means of core cooling prior tagging out 22 RHR pump. This was discovered by the watch engineer (shift technical advisor) upon reviewing the tagout prior to applying it. This error was attributed to the fact that the work was originally scheduled to be completed on-line; however, the plant had recently entered an unplanned outage. The work scheduled had not been adequately reviewed from a risk perspective to take into account the change in plant status. OAD 38 does not specifically address the need to re-assess risk for pre-scheduled activities after the plant has unexpectedly entered an outage. A temporary procedure change (TPC) was added to OAD 38 which requires the watch engineer to perform a shutdown safety assessment at the beginning of each watch.

c. <u>Conclusions</u>

The team found that the periodic assessment was acceptable, however, it was noted for SSCs monitored under 50.65(a)(2), that the licensee only sampled high safety significant SSCs to verify that a balance between reliability and availability was achieved. In addition, SAO-420, was adequate in evaluating the use of industry operating events when implementing the maintenance rule requirements.

Con Edison had established procedural guidance for assessing risk while taking equipment out-of-service on-line and during outages. The on-line Risk Estimator software is scheduled to be replaced with the more sophisticated Safety Monitor software prior to completion of the current outage. An inspector follow item was opened pending Con Edison's completion of operator training on the new software and resolution of configuration control issues. Outage risk assessment is generally being performed adequately.

M2 Maintenance and Material Condition of Facilities and Equipment

a. Scope

In the course of verifying the implementation of the maintenance rule using IP 62706, the team performed walkdowns with the responsible system engineers to examine the material condition of the systems in which vertical slice reviews were performed.

b. Observations and Findings

Housekeeping in the general areas around the systems and components was considered acceptable. Minor material degradation was noted in some instances, however none of problems noted affected SSC operability. System engineers appeared to be very cognizant of their system responsibilities, that included an awareness of the material condition for those systems in which they were assigned.

c. Conclusions

The condition monitoring program for structures and the overall material condition of the SSCs walked down were acceptable.

M3 Engineering Support of Facilities and Equipment

M3.1 Review of Updated Final Safety Analysis Report (UFSAR) Commitments

While performing the inspection discussed in this report, the team reviewed selected portions of the UFSAR. The team verified that the UFSAR was consistent with the observed plant practices, procedures, and parameters for those systems reviewed.

M4 Staff Knowledge and Performance

a. Inspection Scope

The team interviewed engineers, managers and licensed operators to assess their understanding of the maintenance rule and associated responsibilities.

b. Observations and Findings

The system engineers were knowledgeable of their systems and maintenance rule responsibilities. They were familiar with the maintenance rule and understood the scoping, monitoring, and trending required of them for their systems responsibilities. Additionally, they made good use of industry operating experience to assist in maintaining their SSCs in an (a)(2) status and also in performing root cause evaluations and subsequent corrective actions when functional failures or dispositioning to an (a)(1) status was warranted.

The system engineers generally displayed in depth knowledge of their systems and their responsibilities under the maintenance rule. This reflected recent efforts during the maintenance rule upgrade program to increase engineering knowledge in both of these areas. System engineers had recently completed formal classroom training and on-the-job training during the development of the revised basis documents, which was evident during interviews by the depth of knowledge system engineers demonstrated regarding program requirements and responsibilities. Several of the system engineers interviewed were new to their positions (less than six months), yet displayed a good understanding of the program and their responsibilities. In addition, a team member was able to observe system engineer performance during expert panel meetings throughout the upgrade program and noted the quality of their presentations and system knowledge steadily improved.

Watch crews, including both reactor and senior reactor licensed operators, and work control personnel generally displayed adequate knowledge of the maintenance rule, its requirements, and their responsibilities under the program. Familiarity training had been conducted early in the implementation of the rule but more recently, a document was distributed to plant personnel to brief them on general requirements of the maintenance rule and the current status of the program. It was evident that the operations manager had clearly communicated his expectation regarding the maintenance rule to his staff and they were, to date, fulfilling those expectations.

c. Conclusions

Operations department staff knowledge of the maintenance rule was commensurate with their level of involvement. System engineering knowledge of the rule and of their specifics systems was very good. Licensed operators and system engineers were able to fulfill their responsibilities under the rule during normal operations and emergent work situations. Their understanding of rule was acceptable.

M7 Quality Assurance (QA) in Maintenance Activities

a. Inspection Scope

The team reviewed assessments which were conducted by Indian Point 2 or contract personnel to determine if the maintenance rule had been properly developed, implemented, and maintained.

b. Observations and Findings

The team reviewed various station-wide self assessments of the maintenance rule program implementation and determined that these assessments were in-depth and provided appropriate feedback for maintenance rule program improvements. Industry operating experience was incorporated, as appropriate, together with the audit reviews, thus incorporating the most recent interpretations of the rule. Both internal and external assessments were reviewed. It was noted that the May 1997 audit identified significant deficiencies in regard to the implementation and maintenance of the rule. A total of 13 open item reports (OIRs) were generated to track and resolve these deficiencies. The primary contributor to these deficiencies was the fact that no one individual or group was responsible for the implementation of the maintenance rule program. At the time of the inspection, all short and long term corrective action items had been completed, although a couple of OIRs remained administratively open. The team determined that the correct implementation of the maintenance rule program, as found by the team during this inspection at the Indian Point 2 facility was due, in part, to their responsiveness to the audit findings.

c. Conclusions

The self assessments and audit/surveillance reports were detailed and thorough. The thoroughness and responsiveness to these audit findings helped to ensure that Indian Point 2 correctly implemented the requirements of the maintenance rule.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) Unresolved Item 50-247/98-05-04: primary auxiliary building roof leakage. This item was opened to evaluate the adequacy of licensee corrective action for roof leaks in the primary auxiliary building 98' MCC room and the electrical penetration area. The inspector walked these areas down, both in the rooms and on each respective roof, with the manager of civil projects. Interim repair work (application of roofing tar) was observed to be in progress. It rained during the inspection and it was noted that the electrical penetration area was no longer leaking. The MCC room still leaked, however, this leakage was captured and routed to a bucket. Reroofing was being planned for sometime in late summer of 1998. Since temporary repairs were in progress and permanent repairs were planned, and no hazard was present in regard to equipment damage. The team found no violation of regulatory requirements. This item is closed.

M8.2 (Closed) EA 96-272: Con Edison's failure to maintain proper configuration control over containment isolation valve PCV-863 such that it was left continuously open, contrary to procedural requirements, and contrary to its closed position during normal operation as described in the plant's Updated Final Safety Analysis Report (UFSAR). The team reviewed the licensee's response to EA-272, dated November 8, 1996, and reviewed the corrective actions, which included (1) addition of an automatic containment isolation phase A signal to SOV 863 which automatically closes PCV-863 on a design basis LOCA, (2) elimination of leaks in the nitrogen gas lines, and (3) completion of a 10 CFR 50.59 evaluation which justified the design modification, and revisions to the Updated Final Safety Analysis Report which added the automatic containment isolation function of PCV-863; therefore, the team found that the licensee's corrective actions were acceptable.

V. Management Meetings

X1 Exit Meeting Summary

The team discussed the progress of the inspection with Indian Point 2 representatives on a daily basis and presented the inspection results to members of management at the conclusion of the inspection on June 12, 1998.

The team asked whether any materials examined during the inspection should be considered proprietary. Indian Point 2 personnel indicated that none of the information provided to the team was considered proprietary.

PARTIAL LIST OF PERSONS CONTACTED

Consolidated Edison of New York

D. Croulet, Maintenance Rule Coordinator
J. Ferrick, Operations Manager
P. Kinkel, VP Nuclear Power
V. Mullin, Site Engineering Manager
T. Schmeiser, Plant Manager

LIST OF INSPECTION PROCEDURES

IP 62706	Maintenance Rule

LIST OF ITEMS OPENED

Number	Type	Description
50-247/98-10-01	IFI	Training and configuration control for Safety Monitor system.
50-247/98-10-02	VIO	Failure to disposition (a)(2) SSCs to (a)(1) in a timely manner.
50-247/98-10-03	VIO	Failure to include SSCs under the scope of the maintenance rule.

LIST OF ITEMS CLOSED

Number	Type	Description
50-247/98-05-04	URI	Primary auxiliary building roof leakage.
50-247/96-272	EA	failure to maintain proper configuration control over containment isolation valve PCV-863 such that it was left continuously open, contrary to procedural requirements, and contrary to its closed position during normal operation as described in the plant's UFSAR.

LIST OF DOCUMENTS REVIEWED

SAO-100, Revision 24, Loss of Residual Heat Removal System, dated June 11, 1998

SAO- 420, Revision 12, Operating Experience Review Program, dated May 13, 1996

Indian Point Unit 2 Periodic Assessment for the period of July 1996 though December, 1997, dated June 4, 1998

Indian Point Unit 2 Maintenance Rule Basis Document, Residual Heat Removal System, dated June 4, 1998

Indian Point Unit 2 Maintenance Rule Basis Document, Safety Injection System, Revision 6, dated June 4, 1998

Indian Point Unit 2 Maintenance Rule Basis Document, Gas System, Including N2, H2, and CO2, Revision 1, dated June 3, 1998

Consolidated Edison Company Reply to Inspection Report 50/247/96-01, Notice of Violation, dated November 18, 1996

Modification Procedure FPX-97-88532-F, SOV 863 Containment Isolation Phase A Actuation Signal, dated March 1, 1997

Indian Point Unit 2 Nuclear Generating Station 10 CFR 50.59 Safety Evaluation No. 97-040-MD, dated March 12, 1997

Report on Installation, dated July 10, 1997, modification FPX-97-88532-F, SOV 863 Containment Isolation Phase A Actuation Signal

LIST OF ACRONYMS USED

CITRS - Condition Identification Tracking Reporting System
CCW - Component Cooling Water
CSS - Containment Spray System
CVCS - Chemical Volume Control System
FFs - Functional Failures
HSS - High Safety Significant
IOE - Industry Operating Experience
ISVW - Isolation Valve Seal Water
LOCA - Loss of Coolant Accident
MPFFs - Maintenance Preventable Functional Failures
MR - Maintenance Rule
OIR - Open Item Report
PRV - Pressure Regulating Valve
RCS - Reactor Coolant System
RHR - Residual heat Removal
RWST - Refueling Water Storage Tank
SAO - Station Administrative Order
SIS - Safety Injection System
SSCs - Structures, Systems and Components
WO - Work Order